

What is claimed is:

Sub 917

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1. A machine-vision system for inspecting a device, the device having a first side and a second side, the machine-vision system comprising:
a first inspection station for inspecting a first side of a device;
a second inspection station for inspecting a second side of a device; and
a tray-transfer device that operates to move the device from the first inspection station to the second inspection station, said tray-transfer device further including an inverting mechanism that operates to invert the device so that the first second side of the device can be inspected at the first inspection station and the second side of the device can be inspected at the second inspection station.

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2. The system of claim 1 wherein the inverting mechanism is positioned between the first inspection position and the second inspection position.

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Sub 927
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C1
D1
E1

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3. The machine-vision system of claim 1 wherein the inverting mechanism further comprises a mechanism for flipping the devices carried in a tray, the mechanism further comprising:

a first jaw having a surface for receiving a first tray;

a second jaw having a surface for receiving a second tray;

a mover for moving the first jaw, the first tray having a plurality of devices, the second tray, and the second jaw into engagement with each other, said first tray associated with the first jaw and the second tray associated with the second jaw; and

a rotator for rotating the first and second jaws.

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4. The machine-vision system of claim 3 wherein the mover moves the first jaw in a direction substantially perpendicular to the surface for receiving a tray associated with the first jaw.

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5. The machine-vision system of claim ~~1~~¹ wherein the mover moves the first jaw and the second jaw in a direction substantially perpendicular to the surface for receiving a tray associated with the first jaw.

Sub G3
5 6. The machine-vision system of claim 3 wherein the inverting mechanism moves the plurality of devices to the second tray such that the second sides of a plurality of devices are presented for inspection.

7. The machine-vision system of claim 3 wherein the rotator of the inverting mechanism moves the plurality of devices to the second tray such that the second sides of a plurality of devices are presented for inspection.

8. The machine-vision system of claim 6 wherein the mover of the inverting mechanism is adapted to place the plurality of devices in the second tray at the second inspection station.

9. The machine-vision system of claim 8 wherein the tray transfer device includes means for moving the second inspection station with respect to the inverting mechanism.

10. The machine-vision system of claim ~~8~~⁷ further comprising a picker for picking devices which fail inspection from the second tray.

Sub G5
11. A machine-vision system for inspecting a plurality of devices positioned within a plurality of device-carrying trays, the machine-vision system comprising:
a first tray adapted to carry a plurality of devices;
a second tray adapted to carry a plurality of devices;
a flip station for flipping the plurality of devices carried in a first tray from a first inspection position in the first tray to a second inspection position in the second tray.

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E2
D1
E2

12. The machine-vision system of claim 11 wherein the flip station further comprises:

a first jaw having a surface for receiving a first tray;

a second jaw having a surface for receiving a tray;

5 a mover for moving the first jaw, a first tray having a plurality of devices, a second tray, and the second jaw into engagement with each other, said first tray associated with the first jaw and the second tray associated with the second jaw; and a rotator for rotating the first and second jaw.

10 13. The machine-vision system of claim 12 further comprising:

a first slide clamp for holding at least the first tray, said first slide clamp moving the first tray from a first inspection station to a flip station; and

a second slide clamp for holding at least the second tray, said second slide clamp moving the second tray from the flip station to the second inspection station.

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14. The machine-vision system of claim 11 wherein the flip station further comprises a mechanism for flipping the devices carried in a tray, the mechanism further comprising means for limiting the motion of the rotator.

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15. The machine-vision system of claim ¹⁰~~12~~ wherein the mover moves the first jaw in a direction substantially perpendicular to the surface for receiving a tray associated with the first jaw.

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¹²~~16~~. The machine-vision system of claim ¹⁰~~12~~ wherein the mover moves the first jaw and the second jaw in a direction substantially perpendicular to the surface for receiving a tray associated with the first jaw.

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17 A flipping mechanism for transferring a plurality of devices from a position in a first tray to a position in a second tray, the flipping mechanism comprising:
a first jaw having a surface adapted to receive the first tray;
a second jaw having a surface adapted to receive the second tray;
5 a mover for moving the first jaw, the first tray, the second tray, and the second jaw into engagement with each other, said first tray associated with the first jaw and the second tray associated with the second jaw; and
a rotator for rotating the first and second jaw.

10 18. The machine-vision system of claim 17 wherein the mover can be controlled to remove the first tray from a first inspection surface.

15 19. The machine-vision system of claim 17 wherein the mover can be controlled to place the second tray at a second inspection surface.

20 20. A method for acquiring physical information associated with a plurality of devices placed in a tray, the method comprising the steps of:

inspecting a first side of a device within a first tray;

20 removing the first tray from a first surface and placing the first tray at a flip station;

moving a second tray to a position near the first tray;

25 flipping the first tray and second tray to move the device from the first tray to the second tray and place the device in the second tray so that a second side of the device is presented in the second tray; and

inspecting a second side of the device within the second tray.

21. The method of claim 20, further including the step of moving the second tray to a second inspection surface.

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22. A machine-vision system for inspecting a plurality of devices and for inverting the plurality of devices from being positioned in a first tray, the machine-vision system comprising:

a first jaw having a surface for receiving the first tray;

a second jaw having a surface;

a mover for moving the first jaw, the first tray having a plurality of devices, and the second jaw into engagement with each other, said first tray associated with the first jaw; and

a rotator for rotating the first and second jaw.

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23. The machine-vision system of claim 22 further comprising;

a first conveyer for moving the first tray having a plurality of devices therein to the first jaw; and

a second conveyer for moving the first tray having a plurality of devices therein from the first jaw.

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24. The machine-vision system of claim 22 wherein the first jaw is capable of holding, in any position, a tray devoid of devices.

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25. The machine-vision system of claim 22 further comprising;

a slider for transferring the inverted devices from the second jaw into the first tray.

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add 94
add 947